

WHAT IS CLAIMED:

1. In a wireless communication system having plural base stations defining a signal coverage area for communication with a mobile-appliance located within the coverage area, a method of determining the position within the coverage area of mobile-appliance location determining sensors, comprising the steps of:

(a) determining for each of the plural base stations the capability to receive signals from a mobile appliance;

(b) estimating the transmit power level of the mobile appliance at a selected geographic point in the coverage area;

(c) estimating for each of the plural base stations, the strength of a signal from the mobile-appliance transmitted at the estimated power level from the selected geographic point;

(d) identifying each of the plural base stations estimated to receive a signal above a predetermined threshold from the mobile-appliance;

(e) estimating the accuracy of a calculated position of the mobile-appliance from the estimate of the signal strength received at the identified base stations; and

(f) determining the position of mobile-appliance location determining sensors in the coverage area needed to provide the estimated location determining accuracy within a predetermined threshold.

2. The method of Claim 1 wherein the determined capability of the plural base stations to receive signals is a function of the geographic location of the base stations, the height of the base station, the number of sectors, the orientation of the sectors, the power management architecture of the communication system, and the antenna characteristics.

3. The method of Claim 1 wherein the estimated transmit power level is a function of an estimated signal propagation and the determined capability of the plural base stations to receive signals.

4. The method of Claim 3 wherein the estimated signal propagation is a function of the topology and morphology of the coverage area and a function of a propagation loss model.

5. The method of Claim 1 wherein the estimated strength of the signal received at the plural base stations is a function of the transmit power level and an estimated signal propagation.

6. The method of Claim 1 wherein the estimated accuracy is a function of the estimated strength of the signal received at plural base stations, the determined capability of the plural base stations to receive signals and a capability of the mobile-appliance location determining sensors.

7. The method of Claim 6 wherein the capability of the mobile appliance location determining sensors includes (a) a two-channel time difference of arrival determination capability, (b) a four-channel time difference of arrival determination capability, and (c) a four-channel time difference of arrival combined with an angle of arrival determination capability.

8. The method of Claim 7 wherein the capability of the mobile-appliance location determining sensor is a function of the cost of the location sensor.

9. The method of Claim 8 wherein the step of determining the position of the mobile-appliance location determining sensors includes the step selecting location determining

10046234-011502

sensors having a combination of capabilities that meets a predetermined accuracy at the lowest cost.

10. The method of Claim 1 wherein the estimated accuracy of the position of the mobile appliance is estimated for plural selected geographic points in the coverage area.

11. The method of Claim 10 wherein the estimated accuracy for the plural selected geographic points is plotted as accuracy contour lines on a geographic plot of the coverage area.

12. The method of Claim 1 wherein the step of estimating the accuracy of the position of the mobile-appliance includes the step of estimating a time difference of arrival (TDOA) error between the identified base stations.

13. The method of Claim 1 wherein the step of estimating the accuracy of the position of the mobile-appliance includes the step of estimating an angle of arrival (AOA) error at the identified base stations.

14. The method of Claim 1 wherein the step of estimating the accuracy of the position of the mobile-appliance includes the step of estimating a collateral data generated error.

15. The method of Claim 6 wherein the estimated accuracy of the position of the mobile-appliance is a function of a collateral data generated error.

16. A system for determining the position area of mobile-appliance location determining sensors in a mobile-appliance communication system having plural base stations defining a signal coverage area comprising:

(a) means for determining for each of the plural base stations the capability to receive signals from a mobile appliance;

(b) means for estimating the transmit power level of the mobile appliance at a selected geographic point in the coverage area;

(c) means for estimating for each of the plural base stations, the strength of a signal from the mobile-appliance transmitted at the estimated power level from the selected geographic point;

(d) means for identifying each of the plural base stations estimated to receive a signal above a predetermined threshold from the mobile-appliance;

(e) means for estimating the accuracy of the calculated position of the mobile-appliance from the estimate of the signal strength received at the identified base stations; and

(f) means for determining the position of mobile-appliance location determining sensors in the coverage area needed to provide the estimated location determining accuracy within a predetermined threshold.

17. The system of Claim 16, wherein the mobile-appliance location determining sensors include at least one of a two-channel time difference of arrival sensor, a four-channel time difference of arrival sensor, and a four-channel time difference of arrival combined with an angle of arrival sensor.

18. In a mobile-appliance communication system with plural base stations, a method of positioning location sensors for determining the location of a mobile-appliance within a predetermined accuracy, wherein the location determining sensors are positioned at some but not all of the plural base stations based on an estimated accuracy of the location calculated by the location determining sensors and the costs of the location determination sensors.

19. In a mobile-appliance communication system with plural base stations defining a signal coverage area, a method of positioning location sensors for determining the location of a mobile-appliance within a predetermined accuracy, wherein the location determining sensors are positioned based on minimizing the number of sensors required for the coverage area.

20. The method of Claim 19, wherein the location determining sensors are position as a function of a selected capability of the sensor.

21. In a mobile-appliance communication system with plural base stations, a method of positioning location sensors for determining the location of a mobile-appliance within a predetermined accuracy, wherein the location determining sensors are positioned at some but not all of the plural base stations without requiring measurement of the communication signals between the plural base stations and the mobile appliance.

20251010 10:46:23